INSTITUUT VOOR PLANTENZIEKTENKUNDIG ONDERZOEK
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SOME OBSERVATIONS ON THE EFFECT OF INSECTICIDES AND ACARICIDES ON THE POPULATION OF THE EUROPEAN RED SPIDER MITE (*METATETRANYCHUS ULMI* KOCH) AND ITS PRINCIPAL PREDATORS IN COMMERCIAL ORCHARDS IN THE NETHERLANDS

DOOR

M. VAN DE VRIE EN H. J. DE FLUITER

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INSTITUUT VOOR PLANTENZIEKTENKUNDIG ONDERZOEK (I.P.O.)

Office and main laboratory: Binnenhaven 4a, tel. 2151, 2152 en 3641 Wageningen, The Netherlands.

Staff:

Director: Dr. J. G. TEN HOUTEN.
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Deputy head of the Mycological Dept.: Ir. A. M. VAN DOORN, Wageningen.
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Dr. J. H. VENEKAMP, Biochemist
Drs. J. C. ZADOKS, Phytopathologist

Research workers elsewhere:

Ir. H. A. VAN HOOF, Phytopathologist } detached to „Proefstation voor de Groenteteelt
Drs. L. E. VAN 'T SANT, Entomologist } in de volle grond", Alkmaar, tel. K 2200-4568.
Drs. D. J. DE JONG, Entomologist } detached to „Proefstation voor de Fruitteelt in de
Ir. G. S. ROOSJE, Phytopathologist } volle grond", Wilhelminadorp, Goes, tel. K 1100-2261

Ir. T. W. LEFERING, Phytopathologist/Virologist, detached to „Proeftuin Noord Limburg" Venlo, tel. K 4700–2503.

Drs. G. SCHOLTEN, Phytopathologist, detached to „Proefstation voor de bloemisterij in Nederland", Aalsmeer, tel. K 2977–688.

Ir. G. P. TERMOHLEN, Phytopathologist, detached to „Proeftuin voor de Groente- en Fruitteelt onder glas", Naaldwijk, tel. K 1740–4545.

Guest workers:

Dr. P. A. VAN DER LAAN, Entomologist, „Laboratorium voor toegepaste Entomologie der Gemeente Universiteit," Amsterdam, tel. K 2900–56282.

Dr. Ir. G. S. VAN MARLE, Entomologist, Diepenveenseweg 226, Deventer, tel. K 6700–3617.

Ir. G. W. ANKERSMIT, Entomologist, „Laboratorium voor Entomologie", Agricultural University, Wageningen, tel. K 8370–2438.

Dr. Ir. J. B. M. VAN DINTHER, Entomologist, „Laboratorium voor Entomologie", Agricultural University, Wageningen, tel. K 8370-2438.

Aphidological Adviser:

Mr. D. HILLE RIS LAMBERS, Entomologist, T.N.O., Bennekom, tel. K 8379–458.

Some Observations on the Effect of Insecticides and Acaricides on the Population of the European Red Spider Mite (*Metatetranychus ulmi* Koch) and its Principal Predators in Commercial Orchards in the Netherlands

By M. VAN DE VRIE and H. J. DE FLUITER
Institute for Phytopathological Research,
Wageningen, Netherlands

ABSTRACT

During the last 3 years observations on the effects of insecticides and acaricides on the population development of predatory insects and mites have been made. From these it appears that ovo-larvaecides, either alone or in combination with DDT, caused a sharp decline in red spider density followed by a similar decline in predatory insects which are dependent on the numbers of prey. Predatory mites, however, were scarcely affected.

Application of the ovo-larvaecides together with parathion resulted in a very good control of the red spider mite, but also in an almost total destruction of the predatory mites and bugs.

On untreated trees, the red spider reached such a high density early in the season that damage occurred despite the presence of predators. Later, the pest declined because of lack of food caused by severe bronzing of the leaves. At the same time the predatory insects declined in numbers, but the predatory mites were scarcely affected.

Recommendations are made to those who wish to combine biological and chemical control under Dutch conditions.

INTRODUCTION

The European fruittree red spider mite has become one of the major pests in the apple growing areas in the Netherlands during the last 30 years. In this period remarkable changes in cultural practices have taken place. From these the introduction of new apple varieties which often are more susceptible to red spider mite attack, the introduction of new rootstocks and allied spacings and form of the tree, the increased soil management and use of fertilizers, the totally different control measures against the various fruittree pests are mentioned here.

On one hand these changes did increase the amount and the quality of suitable food for the European red spider mite; on the other hand the application of spray chemicals did not only affect the European red spider mite but also its predators.

During the last three years some observations have been made on the effect of the application of phosphorous insecticides, viz parathion, malathion, TEP[1]) and EPN 300[2], and acaricides viz the ovo-larvaecides, ovotran (PCPCBS[3]), chlorbenside[4] and Tedion, either alone or in combination with parathion or DDT, on the fruittree red spider mites and their predators viz Typhlodromus mites (Collyer, 1956, Dosse, 1953, Kuenen, 1947, Massee, 1954 a.o.) and some bugs.

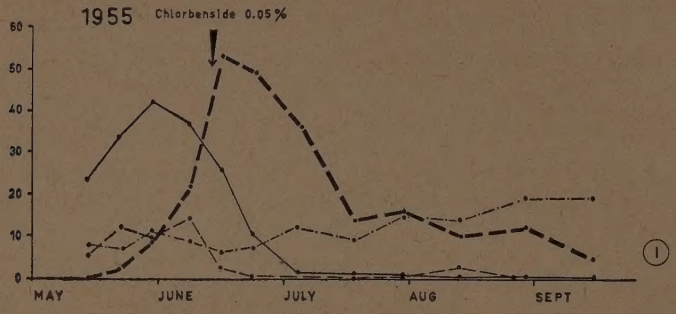
METHODS

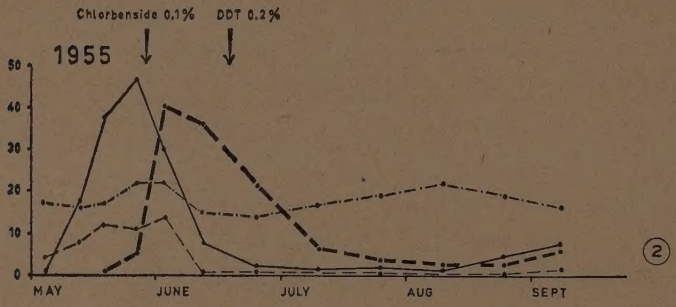
The observations and trials were carried out in commercial orchards. Spraying was done with an ordinary spraying machine as a preblossom spray and/or as a spray shortly after blossom time (apple sawfly spray time). Population counts on treated and untreated (check) trees were made by counting weekly the numbers of mites, eggs and predators present on samples of 100 leaves.

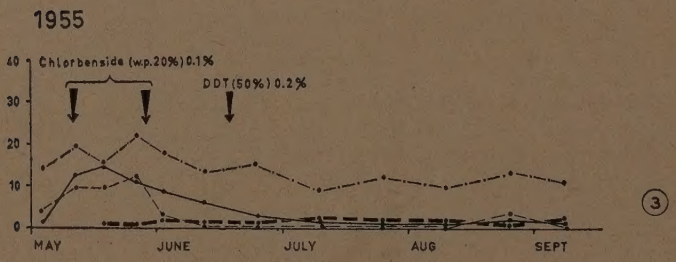
As the predatory *Typhlodromus* mites and the bugs *Anthocoris nemorum* L. and *Orius minutus* L. were the most important predators present, only the figures of these predators are given here (*T. vitis* Oud., *T. tiliae* Oud., and *T. tiliarum* Oud. were present; they were however not separately counted).

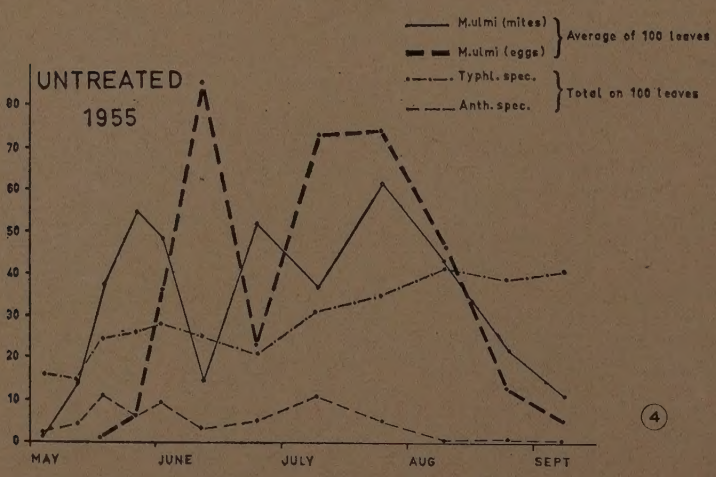
In the trial plots only the fungicides tetramethyl thiuram disulphide (TMTD), zinccarbamate or organo-mercury sprays, which are known to have little or no effect

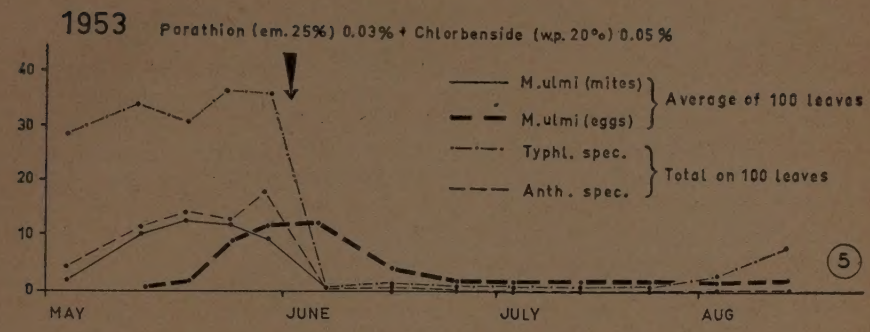
[1] Tetraethyl pyrophosphate.
[2] Aethylparanitrophenylthionobenzenefosfonate.
[3] Parachlorophenyl parachlorobenzenesulfonate
[4] p-chlorobenzyl-p-chlorophenylsulphide.

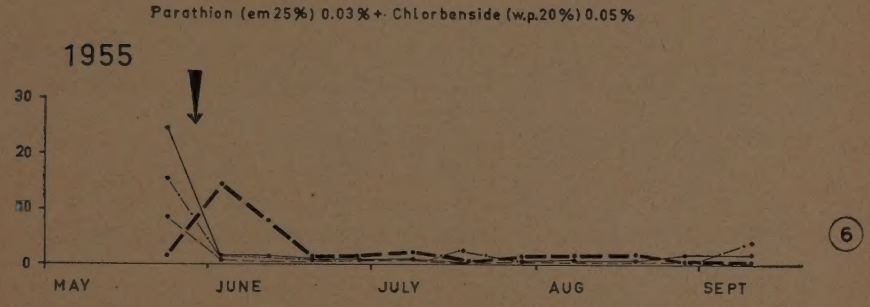

1955
Chlorbenside 0.05%
60
50
40
30
20
10
0
MAY
JUNE
JULY
AUG
SEPT
1

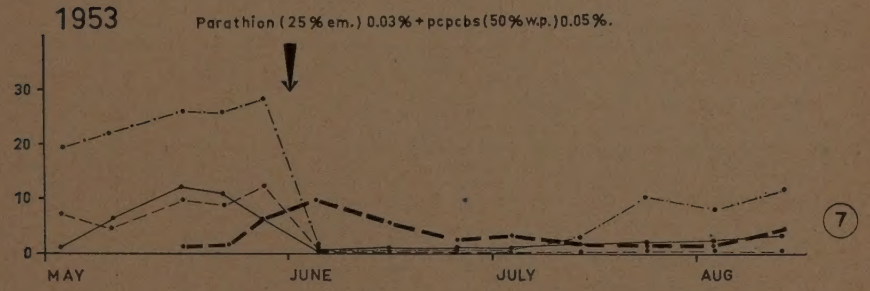

Chlorbenside 0.1%
DDT 0.2%
1955
50
40
30
20
10
0
MAY
JUNE
JULY
AUG
SEPT
2


1955
Chlorbenside (w.p.20%) 0.1%
DDT (50%) 0.2%
40
30
20
10
0
MAY
JUNE
JULY
AUG
SEPT
3


M.ulmi (mites)
M.ulmi (eggs)
Average of 100 leaves
Typhl. spec.
Anth. spec.
Total on 100 leaves
UNTREATED
1955
80
70
60
50
40
30
20
10
0
MAY
JUNE
JULY
AUG
SEPT
4







on the red spider mite populations, were applied; these fungicides were also applied in the "untreated" plots.

The experiments were started in commercial orchards in which in the previous year a normal routine spraying schedule with fungicides and insecticides had been carried out.

This is the reason why the populations of the predators of the red spider mite are small in comparison with the populations in untreated orchards. In untreated orchards, however, the populations of the red spider mite in general are much smaller than in well kept orchards. The reason for this phenomenon is not yet known.

RESULTS

From the experiments it appeared that:

1. Application of the ovo-larvaecide chlorbenside either alone or in combination with DDT[5] (used for the control of the fruittree leafroller and the codling moth)

[5] w.p. 50%, 0,2%.

resulted in a decline of the spider mite population (eggs and mites) followed by a decline of the population of predatory bugs, being dependent on the numbers of mites present. The populations of the *Typhlodromus* mites, however, were hardly affected. In most cases they were present in pretty large numbers, even in those cases where only a few red spider mites or eggs were left (see Graphs 1-4).

2. Application of the ovo-larvaecides together with parathion resulted in a very good control of the red spider mite, but also in an almost total destruction of the predatory mites and bugs (see Graphs 5-7).

3. On the untreated trees of the 1955 trials the red spider mite population already early in the season reached such a high level that discoloration of the leaves occurred not withstanding the presence of predatory mites and bugs. Later in the year the red spider mite population decreased in number by lack of food resulting from the severe bronzing of the leaves. At the same time the population of the predatory bugs decreased but the population of the *Typhlodromus* mites was hardly affected (see Graph 4).

GENERAL DISCUSSION

The most important problem still is: does a quantitative relation exist between mites and predators and if so, is in those cases where a negative correlation occurs, this correlation based on the activity or inactivity of a certain number of predators?

Graph 4 shows the populations of both predators and spider mites present in the "untreated" plots. In interpreting these figures we must bear in mind that in the year before in these plots a normal routine spray schedule was carried out. These treatments had without any doubt an effect on the number of red spider mites and predators present in spring. In these "untreated" plots, however, already early in the season the red spider mite population reached such a high level that discoloration of the leaves occurred.

The effect of the use of organo-phosphorous compounds appeared to be extremely destructive with regard to the predator population.

The effect of the ovo-larvaecides on the Typhlodromus population, however, was hardly visible.

Those who intend to combine biological and chemical control of the red spider mite are suggested to apply these ovo-larvaecides a.o. PCPCBS and chlorbenside.

We in the Netherlands, however, can't yet drop the organo-phosphorous compounds from our chemical spray schedule as they are excellent insecticides to control the green apple aphis (*Aphis pomi* de G.), the codling moth (*Enarmonia pomonella* L.) and the fruittree leafroller (*Adoxophyes reticulana* Hb.) which are also serious pests in our orchards.

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